

A TWO-YEAR PROGRAM FOR  
FOREST MANAGEMENT RESEARCH  
BOISE RESEARCH CENTER

Forest management research at the Boise Research Center is primarily concerned with studies in the management of the ponderosa pine type. Such a course has been followed for many years and will continue to be followed in the foreseeable future. Within the framework of this broad delineation, specific problems and studies change from time to time as new knowledge broadens and economic conditions change.

The problem analysis prepared by Curtis<sup>1/</sup> in 1949 has been the guide in forest management research at the Boise Research Center during the past decade. It directed research effort to the study of silvicultural systems and logging methods in mature and overmature stands of ponderosa pine. The comprehensive, long-term Ponderosa Pine Production Study was established in 1953 and 1954 to fulfill this need. The study is designed not only to test two basic silvicultural systems, but also includes tests of two levels of reserve volume, two logging methods, timber stand improvement, regeneration--both natural and artificial--, and forest regulation.

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<sup>1/</sup> Curtis, James D. A problem analysis for forest management research in the Intermountain Region. Intermountain Forest & Range Experiment Station office report. 1949.

The Ponderosa Pine Production Study is still of number one priority in the long-range plans of the Boise Basin Experimental Forest. With the logging phases of it completed and the timber stand improvement phase underway, regenerating the clear-cut openings is now of immediate concern.

Recent emphasis on reforesting nonstocked acres and the outstanding success of the cooperative Town Creek plantation project have caused greater interest and activity in planting throughout southwestern Idaho. The techniques of planting on all sites, degrees of slope, vegetative types, and soils are still not well known. The successful plantings thus far have been established at a rather large expense for site preparation and careful hand-planting methods.

Research is needed to develop improved and less expensive planting methods in the ponderosa pine type. In view of the size and importance of the regeneration job on old burns as well as logged areas, natural and artificial regeneration problems are considered top priority at the present time.

Other phases of ponderosa pine management are also high on the priority list for research. Young stands of pine are growing up on areas logged in the "early days." To realize maximum growth and yield of desirable products, foresters need to know what stocking levels to maintain in various aged stands on various sites. Spacing or stocking studies in these young stands should be initiated soon in order to have some answers for the future when the intensive management of such stands will be more urgent than it is now.



Management studies in old-growth stands should also continue by maintaining the Ponderosa Pine Production Study according to plan as well as by expanding similar studies to other areas of mature timber on the experimental forest. Harvest cutting methods that will reduce the rather high mortality usually experienced after cutting should be investigated. Other logging methods such as jammers and cable systems also need testing.

Following are the detailed plans of programing studies on the problems just enumerated.

#### Natural Regeneration

An important phase of the Ponderosa Pine Production Study is measuring natural regeneration success in clear-cut openings within the group selection compartments. The 1958 bumper seed crop on ponderosa pine provided the ideal conditions under which such tests can be made.

Major effort during the summer of 1958 was directed toward preparing these openings for seed fall. Most of the clear-cut areas were scarified by bulldozer and brush blade. On moderately steep slopes the openings were strip scarified in an effort to prevent soil erosion. Other areas on still steeper slopes were terraced with a conventional bulldozer. Many variations of slope, exposure, and size of opening are represented.

Seed traps were distributed within the treated areas to measure the quantity and distribution of seed.

Rodents were poisoned on half the treated areas.

As a result of these preparations, the following jobs remain:

### First-year Seedling Germination and Mortality

On a few of the clear-cut openings chosen to represent different aspects with and without rodent poisoning, a detailed sampling of seedling emergence and mortality during the growing season will be conducted. This will take the form of mil-acre quadrats (or possibly smaller quadrats) systematically located across the openings. The number and distribution of the quadrats will be determined by careful observations beforehand. The position of the quadrats will be permanently marked so that subsequent counts can be made on the same quadrats during the season.

At least three and preferably four or five such counts should be made, starting in June and ending in October. Information on seedling emergence and survival will be of great interest as it relates to the numbers of seed known to be present on each area. The response of seedlings on scarified and terraced surfaces in this region will be important new information. The ultimate success or failure of the openings to become satisfactorily restocked by natural seed fall is, of course, the major concern. In addition to the seedling counts, soil temperature measurements will be taken during the season to determine if significant differences are found on various aspects and surface conditions and if seedling survival is related to these temperatures.

Similar counts and observations should be made on the other scarified areas outside the Ponderosa Pine Production Study such as the two shelter-wood areas on the headquarters tract and the scarified strips around isolated trees.



Marvin W. Foiles and James D. Curtis will have joint responsibility for this project. It is expected that material suited for a research note should be available by the end of the season.

#### Two-year Seedling Establishment

A complete appraisal of natural seedling success on all openings in the Ponderosa Pine Production Study will be made at the end of the second growing season, namely in October 1960. This will likewise take the form of quadrat sampling. If time permits several counts will be made during the season, but the count of greatest interest will be the one in October. At that time, each opening will be classified as adequately stocked or not. Those not adequately stocked will be planted in the spring of 1961. A detailed study plan will be prepared to cover the first- and second-year seedling evaluation.

Foiles and Curtis will also have the responsibility of making this appraisal and presenting the results in a co-authored research note or journal article.

#### Seedling Success on Unscarified Areas

Within the Ponderosa Pine Production Study and particularly within the single stem selection compartments, it is anticipated that many new seedlings will be coming up in the spring of 1959 on unprepared surfaces. The number of such seedlings on a few selected areas should be followed by quadrat measurements just as outlined above for the scarified openings. Their success or failure in the small openings created by the removal of single trees is of great interest in the study of the single stem selection silvicultural system.

By the same reasoning, two-year success of such seedlings should likewise be measured in October 1960.

Results of sampling seedling success on unscarified areas could be incorporated into the two previously mentioned reports that are to be prepared by Foiles and Curtis.

#### Seed Fall and Distribution

Data have been collected from the seed traps in the clear-cut openings to give an estimate of the total seed fall from the 1958 crop as well as its distribution by time and distance. Although similar information has been published for ponderosa pine in the past, it is worth reporting again in the light of the conditions found in the Ponderosa Pine Production Study.

Other aspects of the 1958 seed crop such as the collecting job performed by the National Forests and viability tests of 1958 seeds could also be included in this report.

This manuscript should be prepared in the fall and winter of 1958-59 jointly by Foiles and Curtis.

#### Special Cone and Seed Studies

A small study was initiated in 1957 in which conelet and cone colors were followed through the development of cones and the production of seed. Various colors of seed, too, have been observed. It is of interest to learn the relationships of conelet and cone colors, cone color and seed viability, seed color and seed viability, and perhaps seed color and seed size.

James D. Curtis has assumed the responsibility for this study, and he will carry it through as he sees fit. Foiles will cooperate as needed in making seed available for testing.



### Artificial Regeneration

Town Creek has set the stage for considerable additional research in planting methods. Site preparation at the level used at Town Creek has been highly successful. In fact, it is safe to say that this method can be recommended for the brush fields of the Boise Basin (and probably elsewhere) on moderate slopes.

We are not, however, satisfied with dropping the problem here. The cost of 'dozer stripping and furrowing is high. Hand planting methods are also expensive and slow. With vast areas to plant and a very limited planting season available, faster and cheaper methods are needed. Furthermore, there are slopes on which these site preparation measures cannot be used.

Machine planting promises to solve the cost problem on areas of favorable topography. Since the National Forests are making adequate tests of machine planting as well as other site preparation machines, the Station does not expect to study this phase of the problem. We should follow these administrative studies closely, however, in order that the place of the machine will clearly be understood. Wherever machines can do the job, they should be used.

Planting studies which the Station should undertake are presented below:

#### Container Planting

The present project in testing container planting should be carried through to its logical conclusion. This means following second-year survival on existing plantations and making root analyses on the container test plantation. In addition, the present one-year-old seedlings in containers

in the lath house should be grown to the age of 2 years and planted out in 1960 in a test similar to the present "large scale" study. Specifically, the two-year-old container seedling should be planted on various site preparations and on various exposures in conjunction with regular two-year-old nursery-grown seedlings.

A complete evaluation of container planting should be made and results reported at the termination of the study. This should be a joint effort between Foiles and Curtis with Curtis taking the lead.

#### Hand Planting Methods

Much remains to be learned about planting on sites different from Town Creek and on areas where machine methods cannot be used. Some of these conditions are:

1. Brush fields composed of species such as nine-bark, snow berry, and service berry which are not common to Town Creek.
2. Steep slopes where machines cannot be used.
3. Timber sale areas where openings are not of sufficient size to permit efficient use of machines.
4. Very severe sites such as those on steep slopes with loose soils and southern exposures.

To attack this phase of the problem, areas should first be located where such studies can be made. Nine-bark slopes, for example, should be located in the spring of 1959 where spraying trials can be conducted during that spring and summer. Plans to prepare the sites further by plowing should be made for the spring of 1960 (or fall of 1959) so that trees can be planted in 1960.



Areas on severe sites that can be planted without previous spraying should be located and planted in the spring of 1959. They should include the south slopes where little competing vegetation exists and where basins or "casillas" are to be dug by hand methods. No test of machine preparation is anticipated for such areas.

#### Observing National Forest Plantations

With the stepped-up program of planting on the national forests, considerable opportunity is available for studying survival under various conditions found in these plantations. It is likely that some of the situations of surface conditions, site preparation, and exposure, which are of particular interest from a research standpoint, can be found in these forest plantations. An evaluation of these plantations might yield valuable information and save duplicating the tests on experimental areas.

Some time should be devoted to this in the spring and summer of 1959.

#### Large-scale Spraying Study

Four 10-acre plots were aerial sprayed in July 1958 with four different spray mixtures. The original idea behind spraying and planting was to find a method which is cheaper than 'dozer stripping and planting. Both furrowing and planting and planting without furrowing were to be tested in these sprayed plots.

Now, however, machine planting appears to be successful on all but the very steep slopes (slopes in excess of 60 percent<sup>2/</sup>). Since machine planting is less expensive than any type of hand planting, it appears that hand planting should be confined to those slopes that are too steep for planting or furrowing machines, (or areas where machines cannot be used for other reasons such as looseness of soil or size and accessibility of planting areas).

Consequently, the present plan is to use the four 10-acre sprayed plots to study hand planting methods which could be used on very steep slopes. (Not all the slopes on these 4 plots are steep, but in the study it will be assumed that they are). This rules out furrowing or any other kind of mechanical site preparation. It also requires that as complete kill as possible of brush and other competing vegetation be achieved in order that straight hand planting will have a chance of success.

For these reasons, and in the light of previous experience with brush spraying, it is felt that a second spraying in 1959 will be required to give a complete kill of vegetation. The same mixtures of spray and the same technique of spraying as used in 1958 will be repeated in 1959 after the sprouting of Ceanothus and other vegetation has reached the proper stage for spraying.

Planting in these plots will be delayed until the spring of 1960. Details of the planting methods will be formulated before then in a study plan, but they will probably include various degrees of scalping in conjunction with conventional shovel planting.

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<sup>2/</sup> Verbal statement from Mel Coonrod, R-4.



Foiles and Curtis will assume the responsibility of this project with Lynch assisting in the spraying job. The results, after the usual two growing seasons, will be analysed and reported jointly by Foiles and Curtis.

#### Town Creek Plantations

Following the survival counts of the 1958 Town Creek planting in the fall of 1959 (after two growing seasons) a comprehensive analysis of the data will be made by James D. Curtis and the results reported. At that time, plans for further studies at Town Creek in the nature of height, vigor, and diameter measurements or evaluations by exposures will be made.

#### Summary of 1956-57 and 58 Planting Studies

The modest studies initiated in 1956 and enlarged in 1957 should continue to be observed each fall and possibly by 1960 sufficient survival data will be available for a research note.

#### Planting on Ponderosa Pine Production Study

In view of the possible need of planting the terraced and scarified openings in the Ponderosa Pine Production Study, a limited number of trees were planted on terraces in 1958. This should be continued in 1959 on both terraces and scarified areas. These plantings need not be extensive, but they will yield valuable information for use in 1961 when the decision will have to be made to plant these openings if natural regeneration fails. The details of this planting will be covered in a separate study plan.

Summary of Regeneration Studies

<u>Job</u>	<u>Date</u>	<u>Report results</u>	<u>Responsibility</u>
Analyse seed production and distribution on the Ponderosa Pine Production Study and other areas	Winter 1958-59	Winter 1958-59	Foiles and Curtis
Special cone and seed studies	Winter 1958-59	Winter 1958-59	Curtis
Measure first-year success of 1959 seedlings on scarified and unscarified openings	Growing season of 1959	Winter 1959-60	Foiles and Curtis
Measure two-year success of natural regeneration on Ponderosa Pine Production Study	October 1960	Winter 1960-61	Foiles and Curtis
Analyse all container planting	Fall 1959 and Fall 1961	Winter 1961-62	Curtis and Foiles
Prepare for 1959 planting by selecting areas	Spring 1959		Foiles
Prepare for 1959 spraying of ninebark slopes by locating areas	Spring 1959		Foiles
Examine National Forest plantings	Spring and Summer 1959		Curtis and Foiles
Re-spray four 10-acre plots on headquarters tract with helicopter	Summer 1959		Foiles Curtis Lynch
Analyse Town Creek plantations	Fall 1959	Winter 1959-60	Curtis
Summarize all planting studies from 1956 to 1960 and report results	Fall 1960	Winter 1960-61	Foiles and Curtis
Plant scarified and terraced areas on Ponderosa Pine Production Study	Spring 1959		Foiles and Curtis



### Stand Studies

The problem of growing stock levels or spacing in timber stands of various ages and on various sites is another major problem in the ponderosa pine zone. It is considered second only to regeneration in priority. With the present size of the forest management research staff, however, studies of stocking levels in second-growth ponderosa pine stands cannot be initiated during the next two years. Some preliminary studies can be conducted, however, which will provide background for a more comprehensive approach later.

The thinning project on the Ponderosa Pine Production Study that has been in progress each season since 1956 will be continued at about the same level. This requires considerable time of the superintendent as well as field assistants. It will yield valuable results of thinning by two methods at two intensities. It does not include the complete range of stocking, site, and age that will be tested in the proposed comprehensive stocking study.

As further background in the general field, several old plots should be remeasured and the results analysed.

### Remeasurement of Old Plots

A set of thinning plots established in 1934 are located in Barnock Creek. They had one remeasurement in 1939, but have not been measured since. Although these plots are not designed nor treated in an ideal manner, it is felt that some worthwhile information can be gained by measuring them. Inasmuch as 1959 will be the 25th year since establishment, it will be an ideal time to make the final measurement.

Following the measurement these plots should be treated by harvesting a scattered overmature stand on and adjacent to them which is partially suppressing the young trees on the plots. This harvest cutting might very well be made in conjunction with other harvest cuttings in the same general area to provide a suitable sized timber sale to be attractive to a logger and which will support the necessary road construction.

Following the logging, these plots will be well suited to further study of stocking as a part of the planned comprehensive stocking study.

Foiles will be primarily responsible for remeasuring these plots in 1959, and planning a timber sale in 1960.

Another opportunity to study old plots is present in Pine Creek where the 1934 methods of cutting study took place. Here, the young understory stand was inventoried along with the residual mature timber. Valuable growth information can undoubtedly be collected from all or a portion of these plots.

Foiles should plan to make the measurement of the Pine Creek plots in the summer of 1960.

A comparison of actual growth with calculated growth, using techniques developed at the Inland Empire Research Center, will be one valuable result of measuring these old plots. It will also afford an opportunity to appraise them for possible future studies.



### Harvest Cuttings

Possibly by 1960 plans can be made to prepare a small timber sale in the ponderosa pine type of Bannock Creek to release the understory stand described above, and perhaps to create additional planting sites for further studies in regeneration. Details for such a cutting cannot be anticipated at this time, but it should be considered as a high priority job as time permits. As another phase of planning for future harvest cuts, the remaining virgin ponderosa pine stands of Bannock Creek should have a cut of some kind in the near future. This might take the form of a sanitation salvage cut, a full-scale harvest cut to begin a forest regulation program, or it might take the form of additional tests of harvest cutting methods such as the "once-over system" suggested by Curtis. Consideration should be given to testing additional logging methods such as the jammer or portable spar. Such plans should be taking shape by 1961.

### OTHER FOREST TYPES

The program outlined above for the ponderosa pine type will completely occupy the present Forest Management Research staff for the next two years. It is very doubtful if studies in other timber types can be initiated until sometime after 1960 unless a larger staff is available.

High on the priority list of studies to be started in other types is a harvest cutting in Douglas-fir. The new Upper Bannock road taps a suitable area on which such a study could be made.

As time permits, plans should be developed for such a study to be executed when man power is available.

Summary of Stand and  
Management Studies

<u>Job</u>	<u>Date</u>	<u>Responsibility</u>
Continue the TSI project on the Ponderosa Pine Production Study, Boise Basin Experimental Forest	1959 and 1960	Foiles
Remeasure Bannock Creek thinning plots	1959	Foiles
Calculate growth and analyze data from Bannock Creek thinning plots	1959 -1960	Foiles and Lynch
Conduct a timber sale in the vicinity of the Bannock Creek thinning plots--including building a road into the area	1960	Foiles
Remeasure the Pine Creek plots	1960	Foiles
Calculate growth and analyze data from Pine Creek plots	1960 -1961	Foiles and Lynch
Prepare for a timber sale in Pine Creek	1961	Foiles
Plan methods of cutting and regeneration study in the Douglas-fir type	As time and man power permit	Foiles Lynch and Curtis
Conduct timber sale in Pine Creek	Probably not until 1962	Foiles
Plan harvest cutting in remaining virgin stands of Bannock Creek	As time and man power permit	Foiles Lynch and Curtis

Approved:

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